REMARKS

Claims 1-5 and 7-21 are in this application and are presented for consideration. By this Amendment, Applicant has amended claims 1, 7, 8 and 19. Claim 6 has been canceled. Applicant has added new independent claim 21.

Claims 1, 2, 13 and 14-16 have been rejected under 35 U.S.C. 102(b) as being anticipated by Takagi et al. (U.S. 3,954,215).

The present invention relates to a friction welding machine and a process for operating a friction welding machine. The machine comprises a first headstock having a first spindle with a first workpiece holder and a first spindle drive. A feed drive with a second workpiece holder is provided. The machine further comprises a second headstock with a second spindle, with a spindle drive and with the second workpiece holder. The second headstock is connected to the feed drive. The second headstock is mounted to the frame such that the second headstock is movable in an axial direction on the frame. At least one of the first workpiece holder and the second workpiece holder has a bridge. The bridge advantageously relieves one of the first spindle and the second spindle of the torque and the forge force that are created during friction welding. This advantageously increases the service life of at least one of the spindles since the spindle is not intense forces produced by the friction welding. The prior art as a whole fails to disclose such features or such force relieving advantages.

Takagi et al. discloses a main driving motor 1 mounted on a bed 2 of a friction welding apparatus. A main platform 3 is mounted on the left hand side of the bed 2, while at the left hand side of platform 3, the first main spindle 4 is rotatably supported by bearing 5. Between

a driven pulley 6 attached to the left end of the main spindle 4 and a driving pulley 7 of main driving motor 1, a belt 8 is connected. A second main spindle 9 is rotatably supported by bearing 10 at the right hand side of main platform 3 so as to be coaxial with first main spindle 4. A chucking member 12 for holding a first workpiece 11 is fixedly attached to the right hand end of the second main spindle 9. A subordinate platform 15 is mounted on a base 16 and is fixed on the right hand side of the bed 2 so as to be capable of axially moving back and forth along base 16. A secondary driving motor 19 and a transmission means 20 is directly connected to the secondary driving motor 19 and are placed on a support plate 18 which extends from the right hand end of the subordinate platform 15 along base 16. A chucking means 28 is provided for holding a second workpiece 27 which faces first workpiece 11.

Takagi et al. fails to teach or suggest the combination of at least one of a first workpiece holder and a second workpiece holder having a bridge that relieves at least one of a first spindle and a second spindle of the torque and the forging force produced during friction welding. At most, Takagi et al. discloses a chucking member 12 and a chucking means 28. However, neither the chucking member 12 nor the chucking means 28 of Takagi et al. has a bridge as claimed. In contrast to Takagi et al., at least one of the first workpiece holder and the second workpiece holder has a bridge. The bridge advantageously relieves one of the first spindle and the second spindle of the torque and the forging force that are generated during friction welding. This advantageously increases the service life of the spindle since the intense forces produced during friction welding are not constantly exerted on the spindle. Takagi et al. fails to disclose such torque and forging force reducing advantages since the chucking member 12

and the chucking means 28 do not have a bridge as featured in the claimed combination. As such, the prior art as a whole takes a different approach and fails to teach or suggest each feature of the present invention. Accordingly, Applicant respectfully requests that the Examiner favorably consider claim 1 as now presented and all claims that depend thereon.

Claims 3-5 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi et al.

As previously discussed above, Takagi et al. fails to teach and fails to suggest the combination of at least one of a first workpiece holder and a second workpiece holder having a bridge. As such, all claims define over the prior art as a whole.

Claims 6, 7, 11 and 17-20 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi et al., and in view of Gordon et al. (U.S. 3,536,242).

As already discussed above, Takagi et al. does not disclose a bridge as recited in the claimed combination. Gordon et al. also fails to provide any teaching or suggestion for a bridge that receives torque and forge force during friction welding such that one or more spindles do not receive the forge force and the torque generated by the friction welding. The Office Action takes the position that the nonrotatable chuck 14 is the equivalent of the bridge of the present invention. Applicant respectfully disagrees. The reference must be given a fair reading for what it teaches. Gordon et al. merely discloses a nonrotatable chuck 14 for releasably securing a first weld piece 16. Gordon et al. is void of any teaching or suggestion that the nonrotatable chuck 14 relieves one or more spindles of the torque and forge force produced during friction welding. In contrast to Gordon et al., one or more workpiece holders has a bridge that is used to release

at least one of the spindles from the axial strain and the welding forces and torque generated during friction welding. This significantly increases the service life of the spindles and reduces the chances of the spindles failing. Compared with the present invention, Gordon et al. only teaches holding a workpiece with a nonrotatable chuck 14, but Gordon et al. is absolutely void of any teaching of providing the nonrotatable chuck 14 with a bridge to reduce the forces exerted on a spindle as claimed. Gordon clearly teaches only one spindle wherein no bridge is provided such that the spindle receives the forces created by friction welding. This disadvantageously provides a spindle that has a shorter service life due to the high forces exerted on the spindle. As such, the prior art as a whole takes a different approach and fails to direct the person of ordinary skill in the art toward a workpiece holder having a bridge that reduces the forces exerted on a spindle as claimed. Accordingly, Applicant respectfully requests that the Examiner favorably consider claim 19 and all claims that depend thereon.

Claims 8 and 9 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi et al. in view of Gordon et al., and further in view of Farley et al. (U.S. 3,542,383). Although Farley et al. teaches a chuck assembly for securing a tubular workpiece in an inertia welding machine comprising a restrictable outer chuck and an expandable inner chuck, the references as a whole fail to suggest the combination of features claimed. Specifically, Takagi et al. and Gordon et al. provide no suggestion or teaching for the combination of at least one workpiece holder having a bridge for relieving one or more spindles of torque and forging force that are generated during friction welding. As such, the references together do not teach or suggest the combination of features claimed. One of ordinary skill in the art is presented with

various concepts, but these concepts do not provide any direction as to combining the features claimed. All claims define over the prior art as a whole.

Claim 10 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi et al. in view of Farley et al.

As previously discussed above, Takagi et al. provides no teaching or suggestion for the combination of at least one of a first workpiece and a second workpiece holder having a bridge that receives the forces generated during friction welding. This advantageously relieves at least one spindle of the forces generated during friction welding. Farley et al. also fails to disclose a bridge as claimed. At most, Farley et al. discloses a chuck assembly having inertial weights 24 mounted on a spindle. However, Farley et al. does not teach and does not suggest that the weights 24 relieve the spindle of forces generated during friction welding as claimed. As such, all claims define over the prior art as a whole.

Claim 12 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi et al., and in view of Deemie et al. (U.S. 3,439,853). Although Deemie et al. teaches a friction welding machine having a backstop extension assembly for accommodating various long lengths of weld pieces, the references as a whole fail to suggest the combination of features claimed. Specifically, Takagi et al. provides no suggestion or teaching for the combination of at least one workpiece having a bridge that reduces the forces exerted on at least one spindle as claimed. As such, the references together do not teach or suggest the combination of features claimed. One of ordinary skill in the art is presented with various concepts, but these concepts do not provide any direction as to combining the features claimed. All claims define over the prior art

as a whole.

Applicant has added new independent claim 21. New independent claim 21 highlights that each headstock has a spindle drive mounted thereon. Applicant respectfully requests that the Examiner favorably consider new independent claim 21.

Favorable consideration on the merits is requested.

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Attached: Petition for One Month Extension of Time

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SHOULD ANY OTHER FEE BE REQUIRED, THE PATENT AND TRADEMARK OFFICE IS HEREBY REQUESTED TO CHARGE SUCH FEE TO OUR DEPOSIT ACCOUNT 13-0410.